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CARD-INDEX RECORD AND FILING SYSTEMS

FOR

ENGINEERS and CONTRACTORS

Reprinted from ENGINEERING NEWS, August 2, 1906

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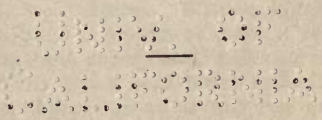
Card-Index Record and Filing Systems for Engineers and Contractors

Reprinted from
Engineering News, August 2, 1906



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CARD-INDEX RECORD AND FILING SYSTEMS FOR ENGINEERS AND CONTRACTORS.

The remarkable development of the card-index system of keeping and filing records has afforded exceptional facilities for simplifying the important records employed by engineers and contractors, and for making these records more easily available than under any other system. This applies especially to the records of progress and cost of works under construction, in which it is of great importance to keep constant track of these two features. With a number of such works in hand it would be difficult to keep them under constant supervision and control from the office by any but a card-index system, which enables the figures for all or any one of the works to be made readily accessible. The system is also now being largely used in keeping individual ledger accounts and other office records, and it is stated that the adaptation of the card system to bookkeeping purposes has been one of the strongest aids in simplifying and facilitating the conduct of office affairs. This is especially the case in regard to construction and contract work. The use of the card-index system in connection with the indexing and filing of plans, drawings, etc., has already been described in our columns at different times, and a full description of the system adopted in the engineering department of the Pittsburg & Lake Erie Ry. was published in our issue of Jan. 2, 1902. As examples of the

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various records and other purposes to which the card-index system is adapted, we present herewith a number of representative cards in actual use by different companies and firms. Most of these are made by the Yawman & Erbe Mfg. Co., of Rochester, N. Y., and for copies of them, with general particulars of their use, we are indebted to Mr. Wm. J. Mullin, Manager of that company's educational department, and to Mr. Myron S. Falk, Engineer of the Godwin Construction Co., New York.

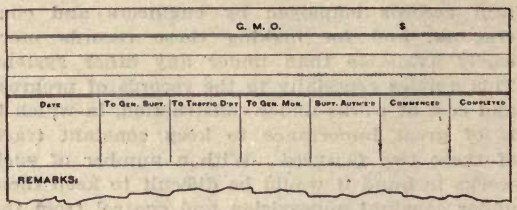


Fig. 1. Card Record of New Work; Southern Pacific Ry.

In regard to the introduction of these systems Mr. Mullin states as follows:

Engineers of all classes have been quick to respond to the advantages gained by having an efficient record system in their offices. The development of better methods in office practice within the last few years has been phenomenal. Devices which would save time and promote accuracy have been eagerly purchased and installed by the principals of every kind of business, and no business has received more benefit from an efficient office system than that of engineers and contractors. Busy men, with their energies centered on the outside, and often times with inefficient help in their offices, were greatly handicapped by the methods in vogue up to within recent years, which prevented not alone the utilizing of every individual's full capacity for work,

but caused much mental wory and financial loss as well. To-day, some of the larger concerns have reached such a point of adaptation of modern office devices to their needs that they are able to instantly get at any required information giving the status of any incomplete work, almost up to the moment of investigation.

Card records have been of incalculable service in placing at the disposal of the searcher, minute information regarding any detail of work on hand, unfinished, finished, or prospective. When once an efficient system is installed, and properly maintained, its importance becomes so great that were it withdrawn the depreciation

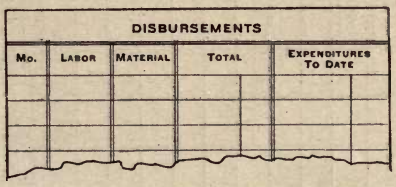


Fig. 2. Reverse Side of Card in Fig. 1.

in outside work would be tremendous. In fact, undertakings of large magnitude cannot be prosecuted at the present time without the highest degree of system being maintained in the offices of the construction company, so that every detail can be closely looked after. The Isthmian Canal Commission early recognized this fact and is installing efficient office aids for records of work as it progresses.

Letters and papers pertaining to any one contract are best filed on edge, in vertical file drawers, all papers bearing upon any one subject or contract being contained in an individual folder and entirely separated from any foreign matters, and these folders being indexed numerically by contract numbers. For instance: "327" would contain all papers shown by the index as relating to "Allegheny Tunnel," while, if it were advisable to subdivide correspondence and other matter relating to this contract, "Employees" would be "327-A;" "Materials," "327-2;" "Sub-Contracts," "327-3," etc. The latter

Job No. Location ABERTHAW CONSTRUCTION CO., BOSTON.

Date 190 Daily Report

Name of Workman	Time Carp.	Time	Time Concrete	Time	Time	Rate	Am't	Put at head of proper column or against each name index of work performed.
1 Foreman								State each kind of work done. Amount of Cem. and Glass used.
2								Weather
3								Temperature
4								
5								
6								
7								
8								
9								
10								

FIG. 3. DAILY REPORT CARD; ABERTHAW CONSTRUCTION CO.

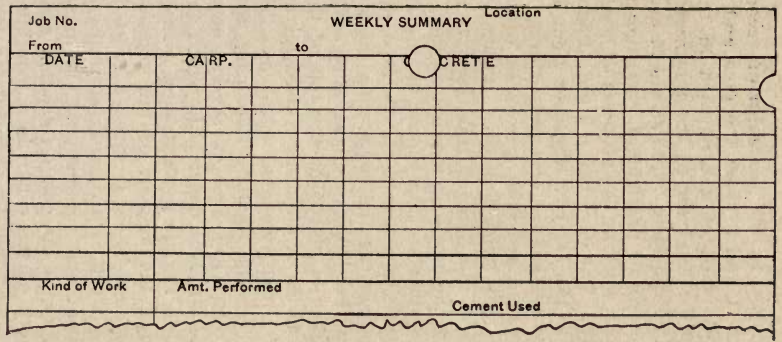


FIG. 4. WEEKLY SUMMARY; ABERTHAW CONSTRUCTION CO.

system is being utilized by S. Pearson & Sons, of New York, who are engaged in the Pennsylvania R. R. tunnel construction for that road's entrance into New York city.

Turning now to the examples of records and cards, Figs. 1 and 2 show the face and reverse sides, respectively, of a card used in the office of the District Engineer of the Southern Pacific Ry., at San Francisco. This shows in condensed form the essential particulars regarding requisitions for new work or the progress of work under construction. The card is 5 × 3 ins. Requisitions coming in to the District Engineer from different parts of the system are first passed upon by him, and if approved are then forwarded respectively to the General Superintendent, the Traffic Department and the General Manager. If the last approves of the work or requisition the superintendent is authorized, as shown by the heading, and the other two spaces on the face show the date of commencing and completing the work. A contract number is given to the work authorized, which number is placed at the top of the card. A varying series of numbers is used for different classes of improvements, such as "Building Bridges," "Laying Rails," "Repairing Stations," etc.; the cards are also of several colors, indicating the different districts in which the work is located. In the upper right hand corner of the card is noted the amount of the appropriation, and on the lines below is given a brief description of the work, with dates of authorization, commencement and completion. On the reverse side, Fig. 2 (with the column heading across the shorter length of the card), is a monthly record of expenditures; this is classified for labor and material, with the total for each month, and the total from the date of commencement. The

cards are filed by the contract numbers, and cross-indexed by subjects as well as by districts. With these and with another series of plain ruled cards, full information as to cost and progress of work can be obtained at any time.

The cards shown in Figs. 3 and 4 are 6 × 4 ins., and are used by the Aberthaw Construction Co., of Boston, Mass. The one shown in Fig. 3 gives a daily summary of the work on any particular job or contract, with account of time put in and material used. The column ruling is the same as the reverse side, so that there are 27 horizontal lines available on each card. Fig. 4 is a card giving a weekly summary of the information compiled from the daily cards (Fig. 3). It is of the same size, but with the back blank, and is white in color, while the daily cards are yellow. The company states that its foremen on small jobs, or timekeepers on larger ones, make all their reports to the office on one form of card, for labor and work performed, while another card is used to report materials received. These reports are made out daily and sent to the office three times a week.

The card shown in Fig. 5 is an employee's time record used by the Engineering Bureau of the city of New York, and is one of numerous card records maintained in these offices. It is 8 × 5 ins. in size, printed on buff paper, and it will be seen that each card provides for the daily record of one employee for an entire year. The reverse side is ruled with horizontal lines for remarks.

The keeping up of ledger accounts with contractors by engineers, railway companies, municipal departments, etc., is a matter of great importance, and the headings of a card used for ledger accounts of this kind are shown in Fig 6. The card is 8 × 5 ins., on yellow paper, and both

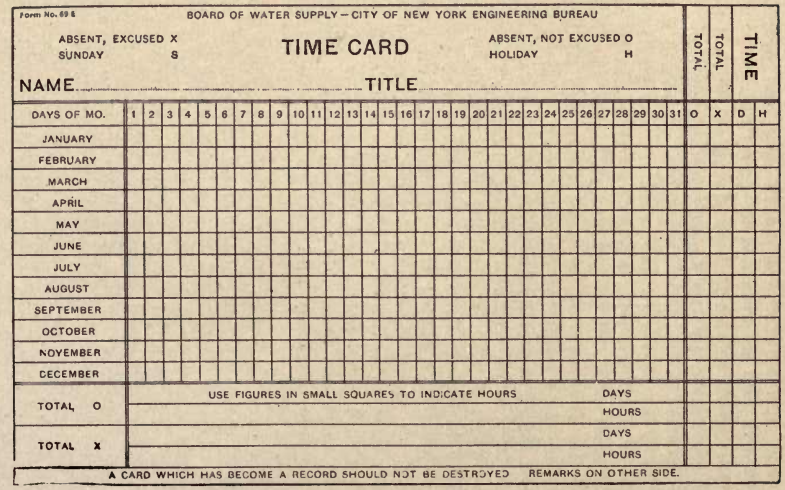


FIG. 5. CARD RECORD OF EMPLOYEES; ENGINEERING BUREAU, CITY OF NEW YORK.

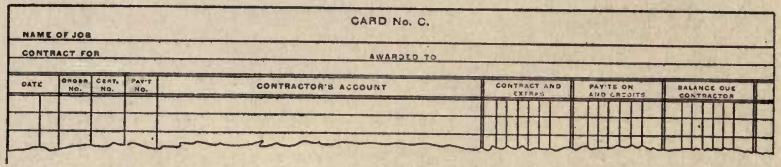


FIG. 6. CARD SYSTEM OF LEDGER ACCOUNTS WITH CONTRACTORS.

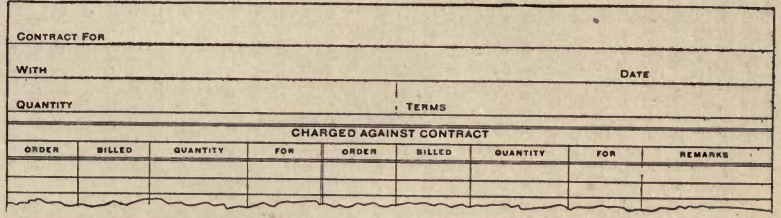


FIG. 7. CARD RECORD OF MATERIALS.

sides of the card are alike. In this way a full record or statement for each contract is shown on the one card, without confusion with other accounts, and the cards are readily filed so that any one account is easily accessible.

Fig. 7 shows a form of card which is used by several large concerns for keeping a record of materials contracted for, and their distribution. It is 8 × 5 ins., on white paper, and the vertical ruling is continued also on the reverse side.

Technical records of construction and repair work are most conveniently kept on cards, and Figs. 8 and 9 illustrate a system of bridge records which has been in use for some time on the Atchison, Topeka & Santa Fe Ry., and has been recently adopted by the Michigan Central Ry. On the face of the index guide card, Fig. 8, which is assigned to each bridge, is given full information as to the location of the bridge, its type, dimensions, age, etc. Behind each index card are filed salmon-colored inspection cards, Fig. 9, one for each inspection; these show the condition of the bridge, with the materials and estimated cost for repairs. In this way full particulars of any bridge and the periodical inspections can be seen at any time. The cards can be printed on tough paper thin enough to permit of blue print copies being made. In the arrangement shown by Fig. 8, the indexing is by numbers, and on large roads, those of each division would be numbered and indexed separately. The word "Bridge" need not be repeated in each case, and cards of a different color may be inserted to show the location of stations, these station cards having the name on a raised tag.

The heading of a card used by a firm of contracting engineers for keeping records of work and cost on individual railway contracts is

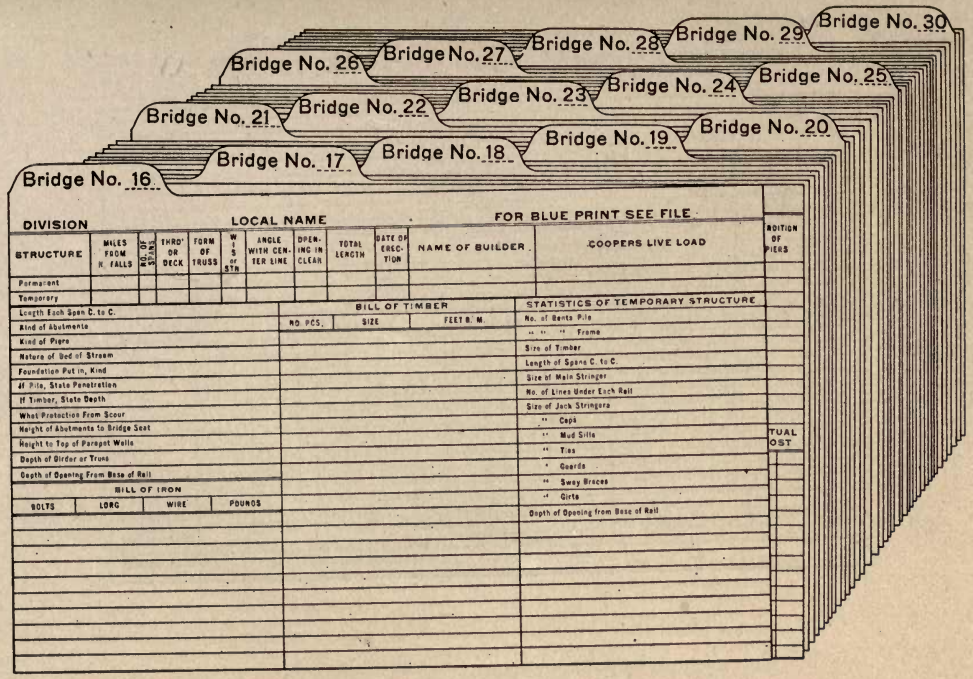


FIG. 8. CARD INDEX FOR BRIDGES; DESCRIPTIVE CARD.

BRIDGE NO. INSPECTED 190 BY

ABUTMENTS KIND AND CONDITION	NO. OF POSTS IN BENT						PILE OR FRAME	MUD SILLS	CAPS	SWAY BRACES	FOUNDATION PILE OR TIMBER	STRINGERS						GUARD RAIL	TIES	DEPTH TO BASE OF RAIL	FORM OF TRUSS	W. I. or S.	CONDITION OF PAINT	GIRDERS	CONDITION OF PIERS
	Bent	1	2	3	4	5	9						MAIN 1	MAIN 2	MAIN 3	MAIN 4	JACK 5	JACK 6								
No. 1	1																								
Remarks	2																								
	3																								
	4																								
	5																								
No. 2	6																								
Remarks	7																								
	8																								
	9																								
	10																								
	11																								

BILL OF MATERIAL NEEDED FOR REPAIRS					
No. Pieces	Size	Ft. B. M.	No. Pieces	Size	Ft. B. M.

SYMBOLS
O. R.—Used for more than one year
D.—Dangerous, remove at once
S.—Should be renewed before 8 mos.
R.—Renewed since last report
R.—Repaired since last report
P.—Pile
Pl.—Plate Girder
F.—Frame
T.—Timber
L.—Light Girder
St.—Stone
S.—Steel

ESTIMATED COST OF REPAIRS			ACTUAL COST	
Timber				
Iron Work				
Labor				
Train Service				
Pile Driving				
Excavation				
Cu. Yds. Stone				
" " Concrete				
" " Paving				
Back Filling				
Cleaning Up				
(over)				

FIG. 9. CARD INDEX FOR BRIDGES; INSPECTION CARD.

SECTION

Railway Construction for _____ Company

Nature of Work

Location

Contract Price | Estimated Cost | Begun | Completed

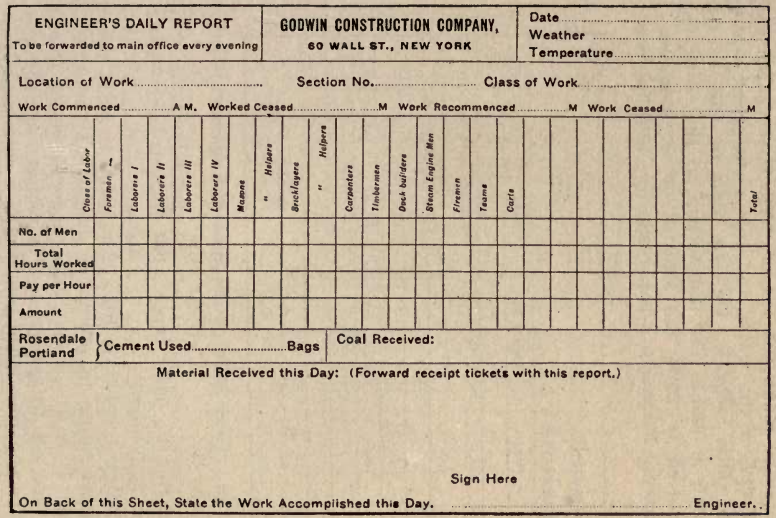
	THIS WEEK							TO DATE			
Week Ending	Work'g Days	Man Hrs.	Team Hrs.	Labor Cost	Material Cost	Unit Used	Unit Labor Cost	Unit Labor Cost	Units Completed	% of Whole	Total Cost or Approved

FIG. 10. CARD SYSTEM FOR CONTRACT ACCOUNTS.

shown in Fig. 10. This is a buff card, 9¾ × 6½ ins., with the reverse side blank. At the head of the card are shown the name and location of the railway; the contract price, estimated cost, and dates of commencement and completion. On the body of the card (with 23 lines for as many weeks) are shown the progress, labor and cost for each week, and also for the entire period ending with each week, together with the percentage of work completed. Thus, by this system, the manager having a large number of contracts in hand can, by looking through the card records, see at a glance how each is progressing, both as to work and cost, and can also at once obtain this information for any one particular contract.

The ten cards described above are illustrative of the various applications of the card system, but the remaining cards are examples of those used by one firm, the Godwin Construction Co., of New York, for the various records required in its business. For particulars of these we are indebted to the company's engineer, Mr. Myron S. Falk. Fig. 11 is a card 6 × 4 ins., for the daily report of the resident engineer of any piece of work. The engineer (or the timekeeper) on each of the company's contracts is required to fill up and mail one of these cards at the close of each day, so that the office is always informed as to the progress of work at any point. On the back of the card (and printed across the narrower width) is the time sheet of the day (Fig. 12), and this is summarized on the face of the card. An inspection of the face, therefore, shows at once the work done, material received, amount of payroll, weather conditions, and the time put in on the work.

In the office these daily time sheet reports are



ENGINEER'S DAILY REPORT
To be forwarded to main office every evening

GODWIN CONSTRUCTION COMPANY,
60 WALL ST., NEW YORK

Date .....
Weather .....
Temperature .....

Location of Work ..... Section No. ..... Class of Work .....

Work Commenced ..... A M. Worked Ceased ..... M Work Recommenced ..... M Work Ceased ..... M

Class of Labor	Foreman	Laborers I	Laborers II	Laborers III	Laborers IV	Masons	" Helpers	Bricklayers	" Helpers	Carpenters	Timbermen	Dock builders	Steam Engine Men	Firemen	Teams	Carts										Total
No. of Men																										
Total Hours Worked																										
Pay per Hour																										
Amount																										

Rosendale / Portland } Cement Used ..... Bags

Coal Received:

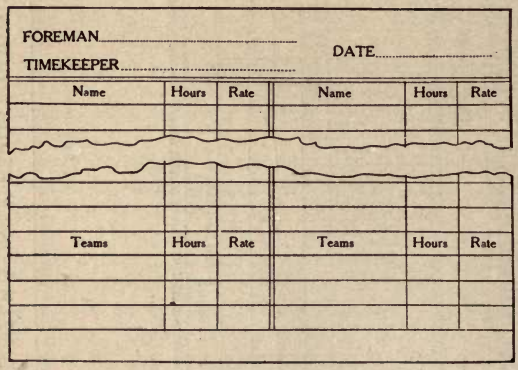
Material Received this Day: (Forward receipt tickets with this report.)

Sign Here

On Back of this Sheet, State the Work Accomplished this Day. ..... Engineer.

FIG. 11. RESIDENT ENGINEER'S DAILY REPORT; GODWIN CONSTRUCTION CO.

collected or summarized on a weekly report card, 6 × 4 ins., shown in Fig. 13. In order to insure accuracy, the timekeeper on the work is also required to make out one of these latter cards at the end of the week, and this must check with the office records. On the back of this card, which is blank, the timekeeper on the work is required to state the amount of work accomplished. Formerly a paper slip 5 × 10½ ins. was



FOREMAN.....

TIMEKEEPER.....

DATE.....

Name	Hours	Rate	Name	Hours	Rate
Teams	Hours	Rate	Teams	Hours	Rate

Fig. 12. Time-Sheet on Reverse of Engineer's Card (Fig. 11.)

used for the daily report, but the card is much more convenient.

The card shown in Fig. 14 is found to be of the greatest value in obtaining quotations for supplies. It is 6 × 4 ins., and as envelopes of this size are not in general use, a return envelope is always enclosed when sending to a supply house for quotations. The employment card, Fig. 15, is used to enable the office to keep a close record of employees and applicants for employment.

The size is 5 × 3 ins., and on the back are lines for the following additional information: 1, References furnished; 2, date of leaving; 3, reason for leaving; 4, date of re-employment; 5, recommendation given.

The ledger accounts are worked up on cards 8 × 5 ins., the style of heading of which is shown in Fig. 16. The headings of the last five columns

GODWIN CONSTRUCTION COMPANY,
60 WALL ST., NEW YORK

Time for Week Ending .....
Sheet No. .....
Location of Work .....
Section No. .....
Class of Work .....

Names / Date																										
S.																										
M.																										
T.																										
W.																										
T.																										
F.																										
S.																										
No. of Hrs.																										TOTAL
Rate																										
Amount																										

NOTE:—On back of this sheet, furnish description of work accomplished this week. SIGN HERE

Fig. 13. Card for Weekly Summary of Time Sheets.

are given only as examples; the actual headings vary for different classes of contracts. The only book that the office keeps is a cash book, and all entries from that book are entered at once on the ledger cards, so that the different items of cost on any work may be found at once.

In addition to these, the office has a number of other forms of cards for various purposes. All bills that are paid by this company are sent out on vouchers 8½ × 7 ins., folding to 3½ × 8½

QUOTATION | SUBJECT

GODWIN CONSTRUCTION CO.,
60 WALL STREET.
NEW YORK CITY, ... 19.....

Messrs. .....

.....

Dear Sirs: Please quote hereon your lowest price f. o. b. .....
..... for the goods mentioned below,
and return this card to us, and oblige,

Yours truly,

A Return Envelope is Enclosed Herewith. .....

Quantity	Article	Time of Delivery	Quotation
			Sign here

FIG. 14. CARD FOR QUOTATIONS FOR SUPPLIES.

ins. for filing. In order to insure proper records of materials, all orders are made out by the company on printed slips of yellow paper 3¾ × 8½ ins.; the foremen or inspectors on the various works are furnished with printed slips of pink paper on which they record all materials received.

The use of ledger accounts for individual pieces of work has been referred to in this article, and

GODWIN CONSTRUCTION CO. 60 WALL ST., NEW YORK.

Application for employment ..... Date .....

Name ..... Entered our employ .....

Address ..... Rate per .....

City ..... Rate changed .....

Age ..... Married ..... Where last employed .....

Reason for change ..... How long there ..... Wages .....

Where second last employed ..... What trade .....

How long worked at it ..... Union member .....

What union .....

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Fig. 15. Card Record of Employees.

it is generally recognized that such accounts are of the utmost importance in railway engineering departments, to enable a proper record and account to be kept of individual contracts. The objection has been made that it is difficult to insure accuracy in such accounts, but contracting engineers, who are vitally interested in the matter of cost, find this quite practicable, and there is no reason why it should not be practicable to adopt the same system in railway service. In fact, this system of accounting has been strongly recommended by the American Railway Engineer-

CONTRACT OF GODWIN CONSTRUCTION CO., AT .....
60 WALL STREET, NEW YORK

SHEET NO.

VOUCHER No.	DATE	PAID TO	TOTAL	LABOR	CEMENT	LUMBER	COAL	SUNDRIES
		FORWARD						

FIG. 16. CARD FOR LEDGER ACCOUNTS FOR INDIVIDUAL CONTRACTS.

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ing and Maintenance of Way Association, although its report refers to loose-leaf book records and does not mention card records.

The use of the card-index system in railway motive-power department offices was dealt with in a paper recently presented before the Western Railway Club by Mr. J. H. Wynne, Mechanical Engineer of the Illinois Central Ry. In addition to a description of a number of forms actually used, it was shown that the system was far superior to book records; the latter are unwieldy, not convenient for reference, and lack the flexibility of the more compact card-index system in allowing for alterations and general expansion. Records of locomotives (with their dimensions, mileage, performance, etc.) are kept in this way; also of cars, shop equipment, supplies, water stations (and quality of water), as well as the ordinary card-index for files of drawings.

Card records are also used by municipal engineers in keeping records of street and sewer work, water mains, etc., the cards showing such information as the kind of pavement, sewer, size of pipe, date of construction, contractor, contract prices and total cost, etc. They are also used in keeping record of surveys.

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